

the sides of the gate are converted to an oxide and an effective channel length of the gate is reduced.

REMARKS

Applicant has carefully reviewed and considered the Office Action mailed on May 23, 2002, and the references cited therewith.

Claims 1, 3, 4, 7, 9, 10, 14, 16, 17, 21, 23, 24, 27, 28, 30, 31, 35, 37, 38, 41, 42, 44, 45 and 54, are amended, no claims are canceled, and no claims are added; as a result, claims 1-48, and 54 are now pending in this application.

§112 Rejection of the Claims

Claims 4, 5, 9, 10, 16, 17, 23, 24, 31, 32, 37, 38, 44, and 45 were rejected under 35 USC § 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

The rejection states:

It is not clear how a dielectric layer can be turned into a silicon nitride layer by remote plasma nitride processing. In this particular case, it is not clear how by nitride processing a silicon oxide layer, a silicon nitride layer is formed. It is not clear how composite oxidation processing of the gate dielectric layer turn the gate dielectric layer to a silicon nitride layer either.

Applicant assumes that some of the claims listed under this rejection were erroneously listed because not all listed claims include remote nitride processing or composite oxidation processing. Applicant assumes that claims 3, 4, 9, 10, 16, 17, 23, 24, 30, 31, 37, 38, 44, and 45 were intended under this rejection. Applicant has amended the above listed claims regarding remote nitride processing and composite oxidation processing to more clearly state the claims. Applicant respectfully submits that the claims as amended are sufficient with regard to 35 USC § 112, first paragraph. Reconsideration and withdrawal of the rejection is respectfully requested.

Claims 35-48 were rejected under 35 USC § 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

The rejection states that “it is not clear how a number of word lines are coupled to the gates of the number of transistors. Applicant’s use of the word ‘coupled’ is not clear as to what it means.”

Applicant respectfully traverses the assertion that Applicant’s use of the word “coupled” is unclear. One possible interpretation of the word “coupled” includes, but is not limited to, “electrically connected.” Applicant respectfully submits that one of ordinary skill in the art will recognize the word “coupled” and will be enabled pursuant to 35 USC § 112, first paragraph. Further, Applicant respectfully notes that under MPEP § 2173.04, “breadth of a claim is not to be equated with indefiniteness.”

The rejection further states that “it is not clear how a word line can be coupled to a first source/drain region of the transistors either.”

Applicant has amended claims 35, 41, and 42 as detailed above. Applicant respectfully submits that claims 35-48 including the selected amendments described above to claims 35, 41, and 42 are sufficient under 35 USC § 112, first paragraph. Reconsideration and withdrawal of the rejection is respectfully requested.

§102 Rejection of the Claims

Claims 1, 2, 5, 6, 7, 8, 11, 12, 13, 14, 15, 18, 19, 20, and 54 were rejected under 35 USC § 102(e) as being anticipated by Yu (U.S. 6,268,253).

Applicant does not admit that Yu is indeed prior art and reserves the right to swear behind this reference at a later date. Nevertheless the Applicant believes that the present invention is distinguishable from the reference for the following reasons.

The rejection states that:

Yu teaches a method of reducing a channel length in a transistor, comprising: forming a gate dielectric layer 204 on a semiconductor substrate 102; coupling a barrier layer 206 to the gate dielectric layer, wherein the barrier layer

prevents oxide undergrowth; forming a gate 208 on top of the barrier layer, the gate having sides, and an effective channel length defined by the sides; and oxidizing the gate wherein a portion of the sides of the gate are converted to an oxide 212 and an effective channel length is reduced.

Yu appears to show forming “a removable spacer 212 on the sidewalls of the gate structure 208.” The removable spacer 212 of Yu appears to be “formed by using the gate material of the gate structure 208.” (Col 5, lines 39-42). However, Applicant respectfully submits that Yu does not show oxidizing the gate wherein a portion of the sides of the gate are converted to an oxide and an **effective channel length of the gate is reduced**. Applicant describes in detail in the specification on page 1 in the second paragraph and in Figure 1 that:

When evaluating a channel length in a transistor, an important measurement is called the effective channel length, or L_{eff} 180, which is a function of both the physical channel length 160, and the physical gate width 170 of the gate 140 controlling the channel 165. In Figure 1, L_{eff} 180 is shown as a length somewhere between the physical gate width 170 and the physical channel length 160.

Applicant respectfully submits that the removable spacers 212 of Yu cannot reduce an effective channel length of the gate, because at the time of formation of the removable spacers 212, the effective channel length is not yet defined. The removable spacers 212 of Yu appear to be used prior to formation of extension implant areas 240 and 242 to “block implantation of a first dopant from the extension implant areas during formation of the deeper drain and source contact junctions” (Col 7, lines 45-48). As a consequence, the method taught by Yu does not show oxidizing the gate wherein a portion of the sides of the gate are converted to an oxide and an effective channel length of the gate is reduced.

In contrast, Applicant’s claim 1 includes forming a gate on top of the barrier layer, the gate having sides, and an effective channel length defined by the sides and an amount of overlap between the sides of the gate and a pair of source/drain regions, and oxidizing the gate wherein a portion of the sides of the gate are converted to an oxide and an effective channel length of the gate is reduced.

Because the Yu reference does not show every element of Applicant's independent claims, a 35 USC § 102 rejection is not supported. Reconsideration and withdrawal of the rejection is respectfully requested with respect to Applicant's independent claim 1. Additionally, reconsideration and withdrawal of the rejection is respectfully requested with respect to the remaining claims that depend therefrom as depending on allowable base claims.

Further, regarding claims 7, 8, 11, 12, 13, 14, 15, 18, 19, 20, and 54, Yu appears to show formation of removable spacers 212 prior to formation of extension implant areas 240 and 242. Applicant respectfully submits that the Yu reference does not show oxidizing the gate **after all source/drain regions have been formed**, wherein a portion of the sides of the gate are converted to an oxide and an effective channel length of the gate is reduced.

In contrast, Applicant's claims 7, 14, and 54 include oxidizing the gate after all source/drain regions have been formed, wherein a portion of the sides of the gate are converted to an oxide and an effective channel length of the gate is reduced.

Because the Yu reference does not show every element of Applicant's independent claims, a 35 USC § 102 rejection is not supported. Reconsideration and withdrawal of the rejection is respectfully requested with respect to Applicant's independent claims 7, 14, and 54. Additionally, reconsideration and withdrawal of the rejection is respectfully requested with respect to the remaining claims that depend therefrom as depending on allowable base claims.

§103 Rejection of the Claims

Claims 4, 5, 9, 10, 16, and 17 (in so far in compliance with 35 USC 112) were rejected under 35 USC § 103(a) as being unpatentable over Yu in view of Gardner et al (U.S. 6,005,274).

Claims 21, 22, 25, 26, 27, 28, 29, 32, 33, and 34 were rejected under 35 USC § 103(a) as being unpatentable over Yu.

Claims 35-48 (in so far in compliance with 35 USC 112) were rejected under 35 USC § 103(a) as being unpatentable over Yu in view of Gardner et al (U.S. 6,005,274) in further view of Sung et al. (U.S. 6,008,085)

Applicant respectfully submits that neither the Gardner reference nor the Sung reference cure the deficiencies of Yu as discussed above under the 35 USC § 102 rejections. Because the cited references, either alone or in combination, do not show every element of Applicant's independent claims, a 35 USC § 103(a) rejection is not supported by the references. Reconsideration and withdrawal of the rejection is respectfully requested with respect to claims 4, 5, 9, 10, 16, 17, 21, 22, 25-29, and 32-48.

Conclusion

Applicant respectfully submits that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney (612- 373-6944) to facilitate prosecution of this application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

Respectfully submitted,

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CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail, in an envelope addressed to: Commissioner of Patents, Washington, D.C. 20231, on this 23rd day of August, 2002.

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